Final Report

# Fire Effects on Rare Flora and Fauna in Southern California National Forests

Joint Fire Science Program project number **01B-3-3-28**

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## Project Rationale

Fire is an important natural disturbance in most California ecosystems. Management of fire and fuels are crucial concerns, especially in southern California, as population growth brings more urban development to the edges of public lands every year. Prescribed fire and other fuels treatments are applied in chaparral, woodland and mixed conifer ecosystems at the wildland-urban interface to reduce the threat of wildfire spread into populated areas. Under the National Fire Plan, increased acreage will be treated in coming years. Prescribed fire is also used for wildlife habitat modification, especially to increase vegetation age-class diversity in chaparral.

The California floristic province is considered a worldwide biodiversity hotspot for its high number of endemic species and the threat these species face due to habitat destruction (Myers et. al. 2000). Publicly owned lands are rapidly becoming the last remaining habitat for many species. The four southern California national forests (Angeles, Cleveland, Los Padres and San Bernardino) and adjoining areas are home to over 70 threatened and endangered plant and animal species (which are federally-listed or proposed under the Endangered Species Act), plus another 169 that are classified as Sensitive by the Forest Service. While fire is a natural habitat component for most of these species, little is known about the type of fire regime to which they are adapted. Furthermore, prescribed fire frequently differs from wild fire in intensity, severity of effects, and season of burn. Lack of knowledge about the responses of threatened, endangered, sensitive and proposed (TESP) species to fire in general and to prescribed fire in particular can slow the development of fire management plans and impede implementation of prescribed burns in known or potential TESP species habitat.

Few of the federally listed and sensitive species found on or near the southern California national forests are profiled in the national Fire Effects Information System database (FEIS). Land and resource managers need additional information on potential fire effects to these species to facilitate fuels management projects. We proposed to address this information gap through literature research, retrospective studies, and controlled experiments on planned prescribed burns.

## Objectives of this Project

1) Review scientific literature and unpublished reports for information on fire response of threatened, endangered, proposed, and sensitive plant and animal species, as well as their close relatives, on the four southern California national forests and surrounding area. Compile this information in a web-accessible database and published technical report, and add it to FEIS.

2) Survey for the presence of TESP species in prescribed fire and wildfire areas burned within the past 10 years on the four southern California national forests. If found, evaluate the abundance of those species on burn sites. Collect corollary information about the fires (season, severity of effects, pre- and post-fire weather patterns, etc.). Compare results to prefire species surveys, if available, and literature findings on species relationship to fire, and add the information to the database begun in Objective 1.

3) Set up experimental studies on prescribed burn projects that overlap known or potential habitat of TESP plant species or close relatives, in cooperation with national forest staff. Replicated plots within or adjacent to project areas will be subject to modified fire intensity, severity or season of burn to investigate species' response to these variables. Projects potentially involving listed or proposed species will be closely coordinated with the U.S. Fish and Wildlife Service. Coordinate with forest botanists to collect pre- and postfire vegetation data. Results from these studies will further add to the database begun in Objective 1.

## Success in Meeting Objectives

1) Literature research was conducted for 474 species in 262 genera. For the vast majority of species, no information on fire response could be found. Enough information was compiled to create FEIS accounts for 30 species. Three accounts are online from our efforts; we also contributed information to update the accounts of five others already in the system. The remaining new accounts are underway and should be finished by the end of calendar year 2006.

2) The southern California national forests had done a considerable amount of postfire monitoring of rare species after fires that preceded this project, so we focused our efforts on fires that occurred just before or while we were funded by JFSP. We monitored vegetation recovery at two riparian sites on the San Bernardino National Forest that burned in 2002. Several listed and/or sensitive species occurred in the riparian areas before the fires, and these species showed remarkable resilience in persisting or recolonizing the sites within a few years after fire (see Presentations). We located some populations of a federally-listed plant on the Cleveland National Forest that burned in the 2003 Cedar fire. We cooperated with the Sequoia National Forest to fund surveys for vegetation recovery and rare plants after the 2000 Manter fire. In addition, we took 10-year postfire measurements on a wildfire site (burned in 1995) in giant saguaro habitat in central Arizona; these measurements will be used to compare with 10-year postfire data from an earlier burn (1993) of different intensity in the same general area.

3) We developed a "fire cage" technique that could be used to test-burn small plots of other rare species in the future, eliminating the risk of applying broadcast prescribed burning to a large area of habitat before plant responses are understood. Small-scale test burns of several sensitive plant species showed that they were resilient to both winter and late summer burning; this information will allow the San Bernardino National Forest to plan prescribed burns in their habitat. We worked closely with the San Jacinto RD botanist on this project, and she is already using our results in prescribed fire planning. Planned prescribed burning in the habitat for another rare plant on the Cleveland National Forest was never carried out by the Forest, so cooperative

studies we planned could not be done. The Los Padres National Forest did not have any planned burns in or near habitat for rare species during the time of this project.

## Deliverables

| Proposed | Delivered |
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| Annual progress reports to national forests and US Fish and Wildlife Service | Annual JFSP summaries produced; however, we did not submit annual progress reports to the Forests or FWS as originally planned. Results from individual projects were shared regularly with botanists and biologists on the national forests involved. |
| Yearly updates to FEIS database | Species accounts for the FEIS are being prepared for 30 species for which we found sufficient information. Three are online (as of 6/30/06), and the rest are in various stages of preparation (completion by end of 2006). Information was provided to update 5 existing accounts as well. |
| Technical paper summarizing TESP fire effects literature review plus list of pertinent references | A summary of our literature review results will be on the project website. The website includes links to sources of botanical, zoological, and fire effects information that we found useful. Each prepared species account contains an extensive list of literature cited. We do not plan to write a separate technical paper at this time. |
| Technical paper summarizing TESP retrospective studies | Several presentations have been made to professional societies on the studies of riparian vegetation recovery in the Cajon Pass area. A journal article on the Cajon Creek study and a station technical report on the Lost Lake monitoring will be prepared by the end of 2006. The saguaro plot data will be part of a station technical report, co-authored by a cooperator, summarizing results from both fires (1993 and 1995) to be submitted by June 2007. |
| Preliminary report and technical paper on each prescribed burn project | Several presentations to professional societies and two conference papers have resulted from experimental test burns of *Arabis johnstonii*, a Forest Service-sensitive species. A journal article is in preparation and will be submitted by Nov. 2006. |
| Website of project information | Under construction as of 6/30/06; will be available through http://www.fs.fed.us/psw/rfl/ . We expect to have the initial version online by 8/30/06. |
| Additional deliverables | Funding from this project allowed completion of publication of proceedings from a 2000 biodiversity conference that included papers on fire effects and rare species. |

## Presentations and Publications

### Presentations

(see also Publications list below)

Narog, Marcia G., Jan L. Beyers, Christie Sclafani, and Christina Escobar. 2003. Fire and clear-cutting in California riparian habitat. Offered poster presented at annual meeting of the Western Section of The Wildlife Society, February 27-March 1, 2003, Irvine, CA.

Sclafani, Christie, Marcia Narog, and Jan Beyers. 2004. Wildfire: Impact and recovery of riparian habitat in southern California. Offered poster presented at 89th annual meeting of Ecological Society of America, August 1-6, 2004, Portland, OR. Abstract available online at: http://abstracts.co.allenpress.com/pweb/esa2004/document/?ID=39499 .

Narog, Marcia G. and Christie J. Sclafani. 2005. Fire tolerance trials suggest positive outcome for prescription burning of a forest sensitive species. Offered poster presented at Wildland Fire 2005 conference, February 16-18, 2005, Albuquerque, NM.

Narog, Marcia, Christie Sclafani, and Jan Beyers. 2005. Lost Lake vegetation recovery after the Blue Cut fire. Offered poster presented at the 90th annual meeting of the Ecological Society of America, August 7-12, 2005, Montréal, Quebec, Canada. Abstract available online at: http://abstracts.co.allenpress.com/pweb/esa2005/document/?ID=51865 .

Narog, M. G., C. J. Sclafani, and J. L. Beyers. 2005. Southern California riparian habitat two years after wildfire. Invited oral presentation at annual meeting of The Western Section of The Wildlife Society, January 19-21, 2005, Sacramento, CA.

Narog, Marcia., Christie Sclafani, and Jan Beyers. 2005. Wildfire affects southern California riparian habitat. Invited oral presentation at the annual meeting of the Southern California Academy of Science, May 20-21, 2005, Loyola Marymount University, Los Angeles, CA.

### Publications

Beyers, Jan L., Marcia G. Narog, Christie Sclafani, and Christina Escobar. 2003. Using a "fire cage" to test the response of *Arabis johnstonii* to fire. Extended abstract/short paper on CD handed out to attendees at 5th Symposium on Fire and Forest Meteorology Joint with 2nd International Wildland Fire Ecology and Fire Management Congress, November 16-20, 2003, Orlando, FL. P2.16. Offered poster presentation. Available online at http://ams.confex.com/ams/FIRE2003/techprogram/paper_67255.htm .

Kus, Barbara E. and Jan L. Beyers. 2005. Planning for biodiversity: Bringing research and management together. Proceedings of a symposium for the south coast ecoregion. General Technical Report PSW-GTR-195. USDA Forest Service, Pacific Southwest Research Station, Albany, CA. 274 p.

Sclafani, Christie. 2005. *Acanthomintha ilicifolia*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ (2006, June 30).

Sclafani, Christie J. 2006. *Astragalus brauntonii.* In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ (2006, June 30).

Sclafani, Christie J. 2006. *Castilleja cinerea.* In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ (2006, June 30).

Narog, Marcia G, Christie J. Sclafani, Christina Escobar, Kate A. Kramer and Jan L. Beyers. *In press.* Initial response of *Arabis johnstonii* Munz to fire. In: Proceedings of the Fourth Southwestern Rare and Endangered Plant Conference, March 22-25, 2004, Albuquerque, NM. Oral presentation.

## Extenuating Circumstances

Because of personnel shortages in our work unit (PSW-4403) (due to injury and personal situations), the technician we hired for this project was needed to carry out field work for other research projects (JFSP and National Fire Plan) in addition to this one. This meant that library work and writing could not be done as fast as planned. The employee was later on maternity leave for an extended period, and now works only 80% time. One of the PIs for this project (Beyers) was heavily involved in the southern California Forest Plan revision process and had essentially no time to devote to this project until after September 2005; the other PI (Narog) had to direct and lead field work for several other JFSP projects in addition to this one. As a result, writing up FEIS accounts and preparing website material did not occur as quickly as we planned. The material is well-organized at this point and writing is well underway, so that we expect to finish those commitments during 2006 or early 2007 at the latest.

## Species Remaining To Be Written Up For FEIS

We have sufficient information and in various stages of writing up FEIS species accounts for the following species: *Arabis shockleyi, Acanthoscyphus parishii* var. *goodmaniana, Arenaria paludicola, Astragalus albens, Astragalus bicristatus, Astragalus lentiginosus* var. *coachellae, Astragalus lentiginosus* var. *antonius, Astragalus lentiginosus* var. *sierrae, Berberus nevinii, Calochortus palmeri* var. *palmeri, Castilleja lasiorhyncha, Caulanthus amplixicaulis* var. *barbarae, Ceanothus ophiochilus, Eriogonum kennedyi* var. *alpinum, Eriogonum microthecum* var. *johnstonii, Eriogonum ovalifolium* var. *vineum, Monardella linoides* ssp. *oblonga, Nolina cismontane, Phlox dolichantha, Swertia neglecta, Thermopsis macrophylla, Viola pnetorum* ssp. *grisea,* yellow-billed cuckoo, California gnatcatcher, Peninsular bighorn sheep, and southern steelhead. We have information at the genus level for several dozen other taxa as well.